

 <p>SOUTH AFRICAN CIVIL AVIATION AUTHORITY</p>	<p>REPUBLIC OF SOUTH AFRICA</p> <p>CIVIL AVIATION AUTHORITY</p>	<p>CAA Private Bag x08 Waterkloof 0145</p>
<p>Tel: (012) 346-5566 Fax: (012) 346-6059 E-Mail: mail@caa.co.za</p>	<p>AERONAUTICAL INFORMATION CIRCULAR</p>	<p>AIC 64x10 04-04-12</p>

AIRWORTHINESS

CAUTION

DANGERS OF USING AUTOMOTIVE FUEL IN AIRCRAFT ENGINES

- ☞ *Indicates changes.*
- ☞ *This AIC replaces AIC 64.10 dated 1999-05-15.*
- 1. *The present general fuel shortage has given some rise to enquiries regarding the feasibility of using automotive fuels in aircraft engines, particularly as automotive fuels with the higher octane ratings are easily obtainable.*
- 1.1 *Unfortunately the answer to this question is a very decisive one: IN NO CIRCUMSTANCES IS AUTOMOTIVE FUEL TO BE USED OR EVEN MIXED WITH AVIATION FUEL IN AIRCRAFT, even though the octane rating given for the automotive fuel is equivalent to or higher than the octane rating specified by the aircraft engine manufacturer. This notwithstanding, owners of aircraft fitted with low compression engines may apply to the Commissioner to use automotive fuel subject to certain restrictions.*
- 2. *To explain in simple terms the reasons why automotive fuels may not be substituted for aviation fuel, the main differences between these two fuels are given, together with the possible hazards and/or adverse effects which may be expected when an aircraft engine is operated on automotive fuel:-*
 - (a) *The octane ratings given for automotive fuels are not valid for aviation fuels, as different methods are used to determine the anti-knock qualities of the two types of fuel. This results in an appreciable difference in the detonation characteristics of the two fuels, even though the anti-knock ratings are ostensibly the same. This difference could lead to destructive pre-ignition or detonation.*
 - (b) *Automotive fuel has a wider distillation range than aviation fuel, and this can lead to an uneven distribution of the anti-knock components suspended in the gas, in the induction system and combustion chambers.*
 - (c) *Automotive fuels are more volatile than aviation fuels and therefore have a higher vapour lock pressure, which gives rise to the possibility of a vapour lock in the fuel system and consequent engine failure at altitude or where fuel lines are subjected to an increase in temperature. In addition, because of their higher volatility, the risk of fire due to a fuel leak in a hot engine compartment is a greater hazard than with aviation fuel.*
 - (d) *Compared with aviation fuel, which contains only the chemically correct amount of bromine, the tetraethyllead additive in automotive fuel contains an excess of chlorine and bromine. The chlorine is very corrosive, and under severe conditions this quality may lead to exhaust valve failures.*
 - (e) *Automotive fuels are less stable than aviation fuels and can form deposits which can lead to sticking valves, poor fuel distribution and other malfunctions.*
 - (f) *Automotive fuels have certain solvent characteristics which may adversely affect the life of fuel cells, gaskets, seals, flexible fuel lines and other materials used in the fuel system of aircraft.*
 - (g) *The handling or control of automotive fuels is not subject to the same rigid procedures that have to be followed in the case of aviation fuel.*

3. *The attention of all concerned with the operation of aircraft is therefore drawn to the requirement that only fuel specified by the manufacturer of an aircraft engine be used in that engine. Aircraft fuel filler openings must be marked to show the minimum octane rating and type of fuel to be used. This information is also given in the flight or owner's manual for each aircraft.*

- ☞ 4. *Avco Lycoming Service Instruction No. 1070(L), Teledyne Continental Motors Service Bulletin M77-3 and Rolls Royce Light Aircraft Engine Service Bulletin No. T-183 provide very useful and important information concerning the use of aviation fuel. The ability of modern aircraft to cover long distances in a short period of time sometimes creates a fuel supply problem due to geographic locations. The aforementioned documents give alternative fuels with suitable octane ratings for use when the specified fuel is not available. All concerned are advised in their own interest to obtain copies of these documents and to follow the procedures laid down there in.*

COMMISSIONER FOR CIVIL AVIATION